



Electromagnetic Rail Gun

Electric drives on future U.S. Navy ships will make possible significant advances in ship design, fuel efficiency, and numerous shipboard systems, including innovative weapon systems. One such weapon system is the electromagnetic rail gun (EMRG), which uses electricity, rather than chemical propellants, to launch projectiles at long-range targets. The EMRG is one in a family of the Office of Naval Research's Innovative Naval Prototypes (INPs). An INP is characterized by high-risk, high-payoff technologies. If successful, an INP will lead to significant advances in Navy or Marine Corps capabilities.



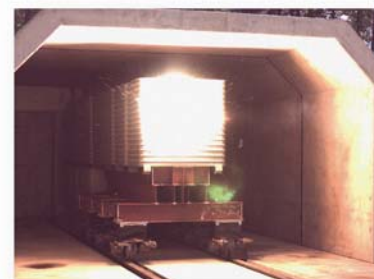
The launcher (barrel) contains a pair of metal conducting rails embedded in a structure made of composite materials. Very strong opposing magnetic fields are generated within the launcher by a high current pulse that flows through the rails and a bridging armature positioned behind the projectile when the rail gun is fired. These fields create a propulsive force that accelerates the armature and projectile out of the barrel. The GPS-guided projectile will exit the launcher at approximately 2500 meters/second. On the way to its target, the projectile would leave the Earth's atmosphere, making it less susceptible to jamming or interception, and minimizing interference with friendly aircraft upon re-entry into airspace.

When operational, the EMRG will provide high-volume, precise, and time-critical fires in all-weather conditions. The goal of the Office of Naval Research rail gun project is to develop and smoothly transition a prototype system that can deliver fires with high accuracy and lethality at distances greater than 200 nautical miles. The rounds will contain little or no high explosive material. Instead, they will inflict damage by way of high-velocity impact. With no explosives or propellants, the logistics of supporting the weapon will be simplified and crew and ship safety will be enhanced.

Key tasks are the development of a launcher, rail gun modeling and simulation toolset, GPS-guided projectile, pulse power system, and integration into a yet-to-be-determined ship class. A 100-shot bore life demonstration is planned for 2011 and a long-range integrated system demonstration is planned for 2015. A fully functioning weapon system aboard a deployable ship is planned in the 2020–25 timeframe.



In Flight



Impact

